DOCUMENT RESUME

ED 188 858 SE 028 250

AUTHOR Steward, W. C.: Menary, John A.
TITLE An Introduction to the Importance of Photography and Gaming Simulation to the Regional Planning Process, Environmental Design and Community Development.
INSTITUTION Nebraska Univ., Lincoln. Coll. of Architecture.
SPONS AGENCY Office of Education (DHEW), Washington, D.C.
PUB DATE [76]
NOTE 24p.: Contains occasional light and broken type.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Communication (Thought Transfer): *Community Development: Education: *Environment: *Environmental Standards: *Game Theory: Information Theory: Photographs: *Photography: *Regional Planning: Simulation: Teaching Methods

ABSTRACT

This report attempts to interrelate essential concepts in visual communication and gaming-simulation with problem solving and education in the fields of regional environmental planning, design, and community development. Use of these methodologies in educating the general public in regional planning topics is also covered. The use of visual or photographic data in conjunction with computerized information systems and gaming simulations are proposed as valuable potential research tools for analysis of subsystem relationships and as a unique vehicle for communication and education. A bibliography is provided. (Author/RE)

**********
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
**********

74-7406

ED188858

# An Introduction to the Importance of Photography and Gaming Simulation to the Regional Planning Process, Environmental Design and Community Development

submitted to
U.S. Office of Education

administered by
U.S. Department of Health, Education and Welfare

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

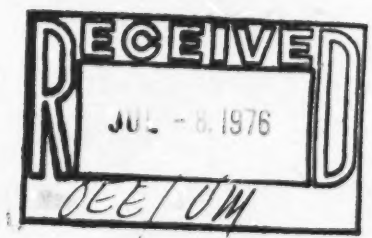
#7406

Dean W. C. Steward, Project Director
College of Architecture

and

John A. Menary, Research Assistant
Community Resource and Research Center

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Walter Bogan of the OEE
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."




College of Architecture
University of Nebraska-Lincoln
Lincoln, Nebraska 68588

SE 028 250

TABLE OF CONTENTS

Abstract . . . . . ii

I. INTRODUCTION . . . . . 1

II. STATEMENT OF THE PROBLEM . . . . . 2

III. PHOTOGRAPHY - VISUAL COMMUNICATION . . . . . 3

A. The Photographic Process and Communication Theory . . . . . 3
B. Why Use Photography? . . . . . 4
C. Previous Studies Using Photography and Cinematography . . . 6

IV. GAMING/SIMULATION . . . . . 10

A. Simulation and Gaming-Simulation: Some Definitions and Common Properties . . . . . 10
B. Utility of Gaming-Simulation . . . . . 14
C. Designing Simulation Games . . . . . 15

V. SUMMARY . . . . . 19

## Abstract

There tends to be a paucity of literature dealing with visual communication and gaming-simulation as they relate to problem-solving and education within the fields of regional environmental planning, design and community development. This report attempts to interrelate certain essential concepts which might be of utility in educating planners, as well as the general public, in the use of these methodologies. A relatively comprehensive bibliography is associated with this report as a supplementary document.

# I. INTRODUCTION

The material presented in this paper is an extension of research accomplished with respect to the development of a Regional-Ecological Information System.

One aspect of this research was to investigate and experiment with the possibility of incorporating visual or photographic data collection procedures and visual information within the computerized information system. In conjunction with gaming simulations, it is felt that these two modes of transmitting information are valuable for two reasons. First, they are thought to have tremendous potential for future research into the complex inter-relationships among various sub-systems of the natural and man-made environments. Second, they provide a unique vehicle of communication and education on problems relevant to environmental design, regional planning, and community planning.

## II. STATEMENT OF THE PROBLEM

The main purpose of this paper is to introduce to the general public certain selected aspects of the communication process as they relate to the regional environmental planning activity. Particularly significant are the areas of photography (visual communication) and gaming simulations.

This paper is divided into two major sub-sections. The first sub-section discusses photography as a methodology for the presentation of information about the man-made and physical environment. In the second section, an examination is made of the field of gaming and simulation, particularly as it relates to introducing the general public to some of the problems associated with the regional planning process, environmental design and community development.

## III. PHOTOGRAPHY - VISUAL COMMUNICATION

This section examines the utility of photography and photographic analysis. Specifically, it is an attempt to place the process of photography within the overall framework of the theory of communication, and to offer some suggestions as to how we could employ photography and cinematography. This is implied in a review of some studies that have been accomplished.

### A. The Photographic Process and Communication Theory

For the purpose of this paper, when discussing photography it shall mean, mainly, the basic "still" photograph, as well as any visual techniques which do not examine "motion." When movement is introduced, it shall be included within the process of cinematography.

By the process of photography is meant the reproduction at some point in time and space of an image of some object (or event) in order to transmit or transfer some information concerning that object (or event) to someone at another point in time and space. By "image" is meant an illustration of some segment of the man-made and/or natural environment which is a "model" of what the real object is like. By model is meant an abstraction which links the conceptual processes within the mind which allows one to identify the object and the actual physical object per se.

Given that the purpose of communication is to transfer some message at one point to another point, then the process of photography can be thought of as a reproduction of information or a set of facts concerning

an object (or event) to another point in time and space; possibly to another individual or group of individuals.

Within the framework of communication theory, communicative actions are conceived of as events that occur in a certain "context." Realizing that the term "context" has many philosophical-definitional problems, it shall be thought of as the situation within which the object or event is said to occur. Given this condition, it is not totally valid to separate the perception and evaluation of signals, both spatial and temporal from the perception and evaluation of the situation in which they occur (Ruesch and Kees, 1956, p. 13).

This implies that not only is there a set of intra-relationships (relations between properties of the object or event) but also a set of inter-relationships between the object (or event) and other objects (or events). For instance, an object called a tree has a set of inter-related properties that allow one to define it as a tree but it also has a set of inter-related properties with other objects--soil, water, landscape, etc.--which must be considered in the photographic process. Therefore, in photography not only is the object (or event) reproduced but the situation (set of inter-relationships) should be either implicitly or explicitly present in the "image."

B. Why Use Photography?

In the sense that has been defined, photographs can relay much information of a descriptive or illustrative nature. It can be conceived of as a descriptive model of both the man-made and natural environments. On the other hand, implicit, if not explicit, are a complex number of facts and relationships which may be important for problem analysis. Reliance on individual verbal descriptions and memory can miss many

significant factors essential to the problem-solving process. To substantiate this, Collier (1967, p. 20) maintains that:

> "Many elements in this community visit are discernible as well with your eyes, but how can written notations preserve the wide variety of ecological impressions? And how precisely? How will you compare your field notebook records made in one locale to those made in another? Or geographically to other regions which might contain comparable environments? How comparable? Impressions gained with the eye alone grow dim, fuse with other impressions, and with time fade away. When you use the camera it is possible to assemble a very complex model which contains literally thousands of tangible elements to be compared to other communities photographed throughout the region."

A further reason for employing photography is that it can be relatively more objective. Individual researchers in the field have a wide range of impressions which they pull from their background. This subjectivity can be minimized to some extent by the use of photographs. Collier (1967, p. 21-22) illustrates based on an experience his group faced in doing research on housing characteristics:

> "The mapping of these characteristics was attempted in Cornell's Stirling County Study in Maritimes of Canada directed by A.H. Leighton. The field team's first attempt to gather data for an affluence and poverty mapping overlay indicated how important photography can be in this kind of surveying. In the project's first attempt to gather data teams of fieldworkers, two to a car, toured the area. Roads, yards, sizes of houses, conditions of repair were checked off appropriately on a dittoed form as they drove down the country lanes. In this test run teams were paired against each other and, to the discouragement of all, the evaluations of the housing did not agree. Fieldworkers quite naturally rated housing against their own environmental background; a fieldworker from the country would treat the houses one way, while a fieldworker from an urban environment would evaluate them in another way. The result was quite a range of impressions. In an effort to stabilize this operation, I went into the same area as the project photographer, making Leica shots of houses down one side of the road and up the other. These were enlarged to 8 x 10 inches and presented to the evaluation team who sat in a circle and passed the photographs--rating each one of the houses on the back. Again, the discrepancy of judgments was far too great, but now the operation had a powerful control--photographs. They were laid on the floor and argued over until the judgments were finally agreed upon and the criteria for rating affluence and poverty in housing were responsibly established. The field team then went about making their survey. The survey could have been completed by photographic reconnaissance, with a group-judging of the housing

> photos which would have given the added advantage of a permanent file record. In the course of the continuing research, I recorded several whole rural communities, each in a matter of hours. This material was shown to key informants who were able to give instructive information about every home in one interview. This offered a responsible source of community mapping and personality identity, obtained without a house-to-house questionnaire."

A third reason is that when discussing things with people, they do not necessarily give you a valid answer to the question. Meyers (1969, p. 155-156) points this out by stating:

> ". . . that people often are not able to tell a researcher why or what they are doing or believe, either because they do not know, or (and more beguiling) because they consciously or unconsciously distort facts, withhold data, or otherwise confound the ethnographer." ". . . that the difference between stated belief and observed behavior may be especially difficult to sort out when information being sought lies in an area culturally regarded as 'controversial' or 'sensitive.'"

C. Previous Studies Using Photography and Cinematography

To offer some ideas as to how one can use photography and cinematography, some examples are taken from the literature. It must be emphasized that not all of these ideas may be appropriate to any one research project. However, the potential is pointed out as being there if anyone should desire to follow up.

Collier (1967, p. 23) illustrates how his group employed photography in his research endeavors. He states the following:

> "Design of the city offers the community research project even greater visual challenges, for the units involved run into thousands. Door-to-door questioning and census material form the basis of much urban anthropological mapping. When samples of streets are photographed evidence for mapping increases. In one of my courses at San Francisco State College students used this approach in mapping a complex urban neighborhood in the City of San Francisco. The fieldworkers divided up the area by streets and proceeded to photograph angle views from the top of each street to the bottom so that all the houses were viewable in the photographs. The mapping area started in the affluent foothills of Twin Peaks and dropped down into the marginal industrial area of the Mission District. From the

photographs, the movement and the condition of housing was established and transposed to a city map. The areas of recent construction rested in the foothills; below were older homes remodeled, older homes in good repair, older homes in deteriorated condition, housing areas invaded by industry, areas completely dominated by industry. Each street yielded its precise measurement. Each fieldworker's photographs were placed on the wall and the group as a whole agreed on the reading. In this way, the research team mapped the housing patterns of the area, bringing to this study refinements unobtainable on the census and appraisers' records. The control factors offered by such photographic reconnaissance can be of great support to scientific findings. The readability of photographic evidence allows for a rapid cross-check of fieldworkers' judgments and stabilized statements can be assembled from the group evaluation."

Research has progressed beyond the field of photography into the area of cinematography. For example, Cunningham (1973) has used a videotape simulation of an urban streetscape to test perceptual responses to physical design. He describes the construction and design of this simulation as follows:

"The space chosen for the simulation is the section of Wisconsin Avenue in Washington, D.C., between "M" and "P" Streets. A photomontage scale model (1:50) was made by photographing each building facade and mounting the strips to styrofoam panels on both sides of the road adjacent to paper sidewalks. A Sony portable video-tape camera fitted with a HCI model-scope, Model 98, was mounted on a wheeled dolly to allow manual adjustment in both the horizontal and verticle planes. Video-tapes were made with the lens of the model-scope at approximately six feet (to scale) above ground level. The equipment was pushed along guide rails at various rates of speed in order to simulate pedestrian and automobile sequences ranging from 0 to 30 miles per hour.

"The black and white video-tape simulation of the model was compared with three films of real streets: (a) a super-8 mm. color film of Wisconsin Avenue, (b) a black and white video-tape reproduction of the preceding, and (c) a super-8 mm. color film of Jefferson Street in Roanoke, Virginia. The video tapes were presented on 14" monitors and the films were shown on white screens placed approximately eight feet from the subjects.

"Research Design

"The research design held constant the observer groups and the response devices while varying the presentation medium in an attempt to determine the effect which the medium might have on the response patterns of the subjects. Biographical data was collected from the subjects prior to the viewing of the first film and was later compared with response patterns.

"Two response devices were used. In the first of these each subject was given a three-position toggle switch wired to a Sanborn pen recorder, Model 67-1200. They were instructed to register interest responses to visual 'excitement' perceived on either the right or left side of the screen by pushing the toggle in the corresponding direction. These responses were recorded on heat sensitive graph paper to be correlated later with the films.

"Following the viewing of each film, subjects were given twelve word pairs on opposite ends of a scale (+3 to -3) and were asked to determine the most appropriate rating for the film sequence which was just viewed.

"Responses to the three films for both tests were compared and correlations were determined between response patterns and various biographical data for each subject. Subjects for the experiments were students and faculty at Virginia Tech. The total sample was comprised of two separate groups of thirty-four and twenty-one persons each, only three of whom were female."

It is possible to employ cinematography to effectively simulate the processes occurring in the man-made and natural environments. However, it should be pointed out that there is a need to be aware of some means of including or accounting for haptic, olfactory, tactile, and auditory sensory stimuli (Cunningham, 1973, p. 71) before responses between films and actual behavior can be compared.

Acking and Kuller (1973) have discovered that movie films taken in the naturalistic environment were very successful in capturing or recreating the real environment. These researchers are expanding their simulation capacity by developing a television system which would allow the potential user of the environment both to move through it as well as to express opinions about the qualities of the simulated as well as the changed environment (Winkel, 1973).

These are just a few illustrations of what has been done and can be done. At least three conclusions are derived from this survey. First, photography and cinematography, although relatively subjective, are relatively more objective in offering descriptions of the natural and built environments. Second, although they appear to be oriented to

environmental design problems they can be employed in the study of human behavior both related and unrelated to design. Third, by means of certain simulations and other photographic techniques, changes can be made to the physical and/or built environment. Any suggested physical improvements to the real environment can be accomplished by these simulation methods at relatively less cost than actual (physical) changes.

## IV. GAMING/SIMULATION

The purpose of this section is twofold. First, to clarify the meaning of the terms simulation and gaming-simulation. Second, to examine some examples in which simulation has been employed.

### A. Simulation and Gaming-Simulation: Some Definitions and Common Properties

To clarify the meaning of the terms simulation and gaming-simulation, it may be beneficial to examine how they have been defined in previous research.

Shubik (1960) offered the following definition:

> "A simulation of a system or an organism is the operation of a model or simulator which is a representation of the system or organism. The model is amenable to manipulations which would be impossible, too expensive or impractical to perform on the entity it portrays. The operation of the model can be studied and from it properties concerning the behavior of the actual system or its subsystems can be inferred."

Hartman (1966, p. 4) defined simulation as:

> "The development and use of models for the study of the dynamics of existing or hypothesized systems."

The System Development Corporation (1965, p. 2) elaborates by stating that simulation is:

> "The systematic abstraction and partial duplication of a phenomenon, activity or operation to effect:
> "1. The design of a system in terms of certain conditions, behavior and mechanisms
> "2. The analysis of a specific phenomenon, or
> "3. The transfer of training from a synthetic environment to a real environment."

Monroe (1968), pp. 6-7) provides a further definition:

> "A simulation is small in comparison to the real system; it can be begun and stopped at will; it is readily observable.
>
> "The properties of a simulation are three types:
>
> "1. Iconic properties, transformed in scale but otherwise the same as the properties they represent
> "2. Analogue properties, in which one property is substituted for another but behaves in the same way as the original property
> "3. Homologue properties in which one property is substituted for another, but the substitute bears only a surface similarity to the property it represents."

Abt (1970, p.6) distinguishes between games and simulation in another sense. Accordingly, Abt claims that:

> "A game is an activity among two or more independent decision-makers seeking to achieve their objectives in some limiting context."

Abt (1970, p. 13) implies that games are observable entities. In terms of a simulation, however, it is a "simplified representation of reality and [it] is always involved in a game; and the game itself becomes an active, dynamic, and changing learning environment." Abt maintains that all games are simulations, but not all simulations are games.

Ray and Duke (1968) maintain that a gaming-simulation is definitionally a combination of the concept of game with simulation. They state the following:

> "(1) We reserve the term gaming for structured interactions between players of roles and (2) reserve the word simulation for in-machine computer operations on models, or sets of linked models, that 'simulate' the world; and (3) hence our term gaming simulation refers only to those cases in which gaming is merged with computer simulations in one vehicle."

Since the purpose of this paper is one of information, not discussion, there will be no refutation of these definitions. However, it is important to be aware of the fact that there are semantic difficulties. On the other hand, there are some common points, which are either implicit or explicit in these definitions that should be stated. These may be considered as follows:

(1) That a simulation is a model of the real world

(2) That this model usually focuses on a micro-level set of decisions and decision-makers

(3) That the elements of the model are specified and described

(4) That the relationships between the elements are defined

(5) That the order and nature of the relationships between the elements is explicit

Many of the simulations, also, share the following (Taylor, 1971, p.18) common features:

"(a) They are principally used for learning how systems react under continually changing conditions
"(b) They are in essence simple abstractions of relatively complex aspects of hypothetical or real world situations
"(c) They very largely achieve their simplicity through reducing complex operations into a series of simply expressed actions controlled by explicit rules
"(d) They expose participants to certain pre-selected features under relatively controlled and risk-free circumstances
"(e) They allow the concerted use of physical models, mathematical representations and human operators
"(f) They require participants to assume roles involving various degrees of cooperation, competition and conflict between players or teams and make decisions which reflect their understanding of key features of the model
"(g) They produce certain decision 'pay-offs'--rewards or deprivations--determined by chance, by reference to human assessments or alternatively by the use of predetermined rules and formulae
"(h) They provide varied experience in controlling the course of events over a series of 'time' spans where the state of the simulated environment is continuously altered in response to the quality of accumulated decision-making
"(i) They generally compress 'time' and, as a result, are able to provide rapid feedback on the results and consequences of decisions
"(j) They progress in predetermined decision stages or periods and each period generally represents an allotted 'time' span during which multiple, and sometimes simultaneous, interaction between cooperating and competing decision agents takes place."

Given that all games are simulations, before continuing one important aspect of games and simulations must be discussed. This is the problem of isomorphism. If a simulation is a model of the real world and a game is a simulation, then a game is indirectly a model of the real-world.

Isomorphism requires that each element or variable in the model correspond to an element of the modeled system and that the relationships between the elements or variables be identical in the model as they are in the real-world. If this is not the case, then the simulation is not a copy or a model of the original system under study.

Accordingly, there are two further considerations of which one should be aware. First, it is implied that there exists some explicitly stated theory which is being tested by the simulation. Furthermore, in constructing an isomorphic model it must be demonstrated that the model operates isomorphically. To accomplish this one must analyze the simulation processes and outcomes and compare these with the actual counterparts (Taylor, 1971, p. 423).

Implied in these statements is the fact that simulations are designed to answer particular problems. This raises a set of questions to be aware of when constructing a simulation and/or a game. These may be listed as follows:

(1) What is the purpose of the simulation?

(2) At what scale should the simulation be modeled?

(3) Which groups will be represented? (Level of sophistication)

(4) What are the objectives?

(5) How much information should be available prior to the simulation and exchanged during the play?

(6) What is the structure of play procedures and temporal sequence of events?

(7) What types of accounting procedures should be used?

(8) How should the game be presented?

(9) Is the game devised to educate the players or acquire information about the behavior of the players, or both?

B. Utility of Gaming-Simulations

In this section an examination is made of the uses of simulation for education (instructional) and research.

Piaget conceived of games as a device whereby individuals could be introduced to certain aspects of the real-world--such as, problems of interpersonal relationships, behavioral changes, collective work and so on. Similarly, Coleman thought that games could serve as a means of learning from the observation of an abstraction of reality. In this connection, Greenlaw contends that some partial understanding of the complexities of the "real" situation may be gained by abstraction or simulation.

Taylor (1971) discusses some of the advantages to games for learning purposes which may be stated as follows:

(1) Games tend to motivate and get people involved

(2) There is an increase in learning with an increase in involvement

(3) Games are usually structured in an orderly fashion; therefore, they can act as a foundation upon which the individual's logical abilities may be commenced

(4) Games allow individuals to grasp the essentials of a complex world. By such an endeavor they relay information and make people aware of complex processes

(5) Games are relatively free from some forms of subjective teacher assessment. Team progress is monitored according to a pre-determined scale so the student may feel less inhibited to become involved and learn

(6) The student is allowed to recognize his/her own individual progress and thereby improve on their cognitive skills

(7) In some ways, games can make an individual more aware of different types of roles in life and minimize the credibility gaps

between students and real-world proponents. That is, they place individuals in roles they might not normally occupy in such a manner that they may begin to examine the real world from another point of view.

C. Designing Simulation Games

Having examined what are simulation games and how they can be used, it may be useful to examine some of the problems related to the design of games.

Duke (1964, pp. 37-38) has set down a set of requirements which he considers essential for any game to be effective. These he lists as follows:

"(a) The prime purpose of gaming-simulation techniques is to provide an environment for self-instruction. The technique is particularly well suited for conveying concepts which have not been made explicit in theory

"(b) Gaming techniques are particularly valuable for conveying concepts of elaborate systems through the device of employing a simplified model. This provides the student with a rudimentary framework useful for the retention and categorization of associated learning experiences, for integration of diverse materials, and as a platform from which new experiences may be evaluated with a resultant expansion of the complexity of the internalized model

"(c) Emphasis must be placed on enhancing learning which is general and structural. The technique must be effective in integrating decision processes, as well as specifics, and in bringing into meaningful focus material derived from conventional educational experience

"(d) The technique must be integrated with conventional teaching experiences. This is necessary to ensure an equitable distribution of teaching resources; further, to obtain maximum benefit from the experience, there must be a careful grading of the complexity level of the game to the students' level of ability and curriculum content, insuring mutual reinforcement of learning

"(e) The game will force player behavior patterns to be explicit in terms of defining the player's own role, the various roles of other players, and the interactions among them; increasing awareness of the complexities resulting from these interactions and of the dynamic nature of the interaction; forcing a summary evaluation by the player of a new and uncertain environment and the consequent adoption of his decision framework; problem definiton, goal formation, the development of long-range plans, and alternatives for implementing these, and policy definition

"(f) The game will enable specific skill development by providing for the introduction of specific techniques, through the presentation of factual information in appropriate context, and which will have a high correlation with skills required for competence in the profession

"(g) Effective gaming requires a vehicle of sufficient realism to generate enthusiasm (as in the case with intra-mural sports) to ensure voluntary participation, to be convincing in the relationships and specifics which it portrays, to create an intensity of group interaction of a sufficiently high level to be of value in building stress immunity in the players, to prevent erratic or unrealistic player response relative to that expected in the 'real world' constraints, and to be capable of creating the high level of motivation required for learning

"(h) Finally, gaming requires a mechanical vehicle which is reasonably convenient to operate, which enables modification and referee intervention when appropriate ('free' game), in which (design) variables are not significantly regarded by random (non-design) happenings, and in which feedback mechanisms are both quick enough in response and sufficiently intricate to influence player behavior"

In practice, it is difficult to develop a game which satisfies the creator's , as well as the user's, needs. One may be forced to search through an assortment of simulation researches and operational games without any guarantee of discovering the proper game. In other words, there appears to be no well-documented set of case studies which explicitly illustrates the design process and points out, step by step, instructions in operationalizing simulation games. In this connection, Taylor (1971, p. 93) describes what is available [as of 1971] as follows:

> "The basic steps in game design in the social sciences have been outlined by many authors in the business studies field including Andlinger (1958); Green and Sisson (1959); Greenlaw, et.al. (1962); and Loveluck (undated); and, in the same area, there are at least two book-long case studies documenting the development of individual models at Harvard (McKinney, 1967) and at what is now Carnegie-Mellon University (Cohen, et.al., 1964). Planning education, to date, has been less fortunate in that comparable reports appear to be nowhere near as common or as complete. Meier (1961 a, p. 242) has set down some general guidance for the social sciences at large but, with the exception of the work of Duke (1964), Taylor and Maddison (1968) and Feldt (forthcoming), there appears to be little of practical significance; Feldt's forthcoming work perhaps offers the most here in that he has devoted three research reports to the detailed description of the methods and techniques for constructing and operation CLUG derivatives simulating specific areas."

There are a number of problems which should be considered before designing a simulation and/or game.

First, since there are no "theoretical guidelines" for determining critical parameters, there is a temptation to draw upon relatively accessible information and to ignore the contentious or unquantifiable data. In Taylor's (1971, p. 94) terminology, "It is a partial view of reality which requires the designer's stand, approach and theoretical base to be explicit if the game is to be seen as a single representation of the referent." Although the simulation exercise is somewhat objective relative to an instructor-student relationship, it can have some implicit, if not explicit, (designer) subjectivity built into it.

A second problem is the extent to which the participant becomes involved within the game. Given that the simulation is only as good as the designer's understanding of that which is being simulated, then one may ask to what extent should the behavior of the players be circumscribed?

Third, at what level of awareness or knowledge should the game be devised. If the simulation requires a certain level of knowledge expected by a player, then what will occur if the participant is above or below this level.

Fourth, the problem of verisimilitude and realism is significant. That is, the model's ability to convince the players that the simulation is both real and appropriate (verisimilitude) and the model's correspondence with reality (realism).

Fifth, the level of complexity of a game is another problem. There is a dichotomy present. On the one hand, the designer wishes to have a simulation that is as accurate as possible, while on the other the participant may be seeking simplicity. The difficulty is one of balancing com-

plexity and simplification while at the same time achieving some semblance of reality.

Another problem is that of quantifiable vs. non-quantifiable elements.

## V. SUMMARY

The purpose has been to offer the general public and interested environmental planners some idea of the advantages and disadvantages associated with these two methods. Also, it is suggested that photographic procedures, as well as gaming-simulations and visual simulations, provide new and informative means of investigating the intricate processes occurring within the natural and man-made environments.

It should be mentioned in concluding that although there are a number of benefits in using these procedures, they should not be employed independently of existing bodies of knowledge. Photography, cinematography and simulation in conjunction with existing theories of the environment and ecology provide a valuable source of new information, as well as being a useful mode of transmitting knowledge concerning environmental issues to varied groups of persons in the urban and rural community. However, further research remains to be done in order to substantiate this assertion.

## REFERENCES


Abt, C.C. (1970). Serious Games. New York: Viking Press.

Acking, C.A. and R. Kuller (1973). "Presentation and Judgement of Planned Environment and the Hypothesis of Arousal," in W.F.E. Prieser (ed), Environmental Design Research, Vol. 1. Stroudsburg: Dowden, Hutchinson and Ross.

Coleman, J.S. (ed) (1966). Simulation Games and Learning Behavior. Beverly Hills: Sage Publications.

Collier, J. (1967). Visual Anthropology: Photography as a Research Method. New York: Rinehart and Winston.

Cunningham, M.C. (1973). "Toward a Perceptual Tool in Urban Design: A Street Simulation Pilot Study," in W.F.E. Prieser (ed), Environmental Design Research, Vol. 1.

Duke, R.D. (1964). Gaming and Simulation in Urban Research. East Lansing: Institute for Community Development and Services, Continuing Education Services, Michigan State University.

Greenlaw, P.S., et.al. (1962). Business Simulation in Industrial and University Education. Englewood Cliffs: Prentice Hall.

Hartman, J.J. (1966). Annotated Bibliography on Simulation in the Social Sciences, Rural Sociology Report No. 53. Ames: Iowa State University.

Monroe, M.W. (1968). "Games as Teaching Tools: An Examination of the Community Land Use Game," Papers on Gaming Simulation No. 1. Center for Housing and Environmental Studies, Division of Urban Studies, Cornell University, Ithaca.

Piaget, J. (1962). Play, Dreams, and Imitation in Childhood. New York: The Norton Library.

Piaget, J. (1962). The Moral Judgement of the Child. New York: The Norton Library.

Ruesch, J. and W. Kees (1956). Nonverbal Communication. Berkeley: University of California Press.

Shubik, M. (1960). "Bibliography on Simulation, Gaming, Artificial Intelligence and Allied Topics," Journal of the American Statistical Association, Vol. 55.

Taylor, J.L. (1971). Instructional Planning Systems: A Gaming Simulation Approach to Urban Problems. Cambridge: Cambridge University Press.

System Development Corporation (1965). "Simulation: Managing the Unmanageable," Santa Monica: System Development Corporation Magazine, Vol. 8, No. 4.